

LAUDERICK CREEK STUDY AREA

Proposed Plan for the Remedial Action at Other Lauderick Creek Clusters 5, 9, 17, 20, 32, and 33

Final August 2001

**U.S. Army Garrison
Aberdeen Proving Ground, Maryland**

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Proposed Plan for

REMEDIAL ACTION ABERDEEN PROVING GROUND OTHER LAUDERICK CREEK CLUSTERS 5, 9, 17, 20, 32 AND 33

**Aberdeen Proving Ground, Maryland
August 2001**

This document is intended to comply with the National Environmental Policy Act in accordance with Army Regulation 200-2

INTRODUCTION AND PURPOSE

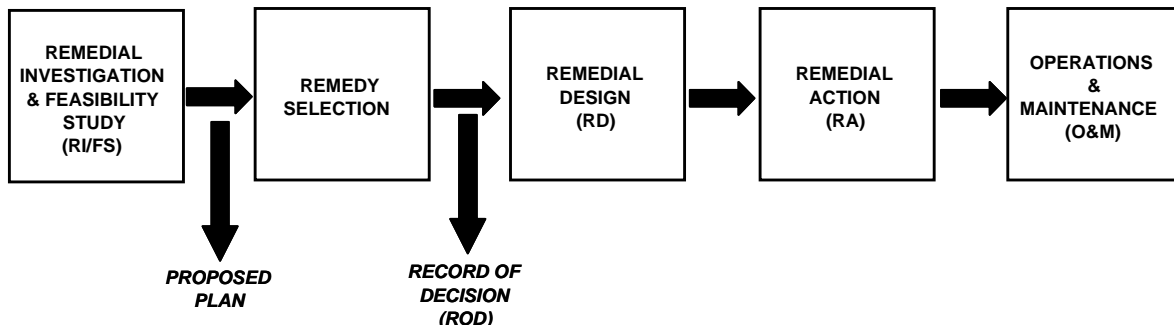
The U.S. Department of the Army at Aberdeen Proving Ground (APG), the U.S. Environmental Protection Agency (EPA), and the State of Maryland Department of the Environment (MDE) invite public comment on this Proposed Plan for the Other Lauderick Creek Clusters 5, 9, 17, 20, 32 and 33 (Figure 1). The Other Lauderick clusters are located in the Edgewood Area of APG, Maryland. These clusters include 12 sites, which require no further action, and 4 sites requiring further remedial response which are addressed in this Proposed Plan (Figure 2).

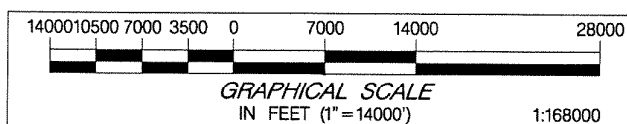
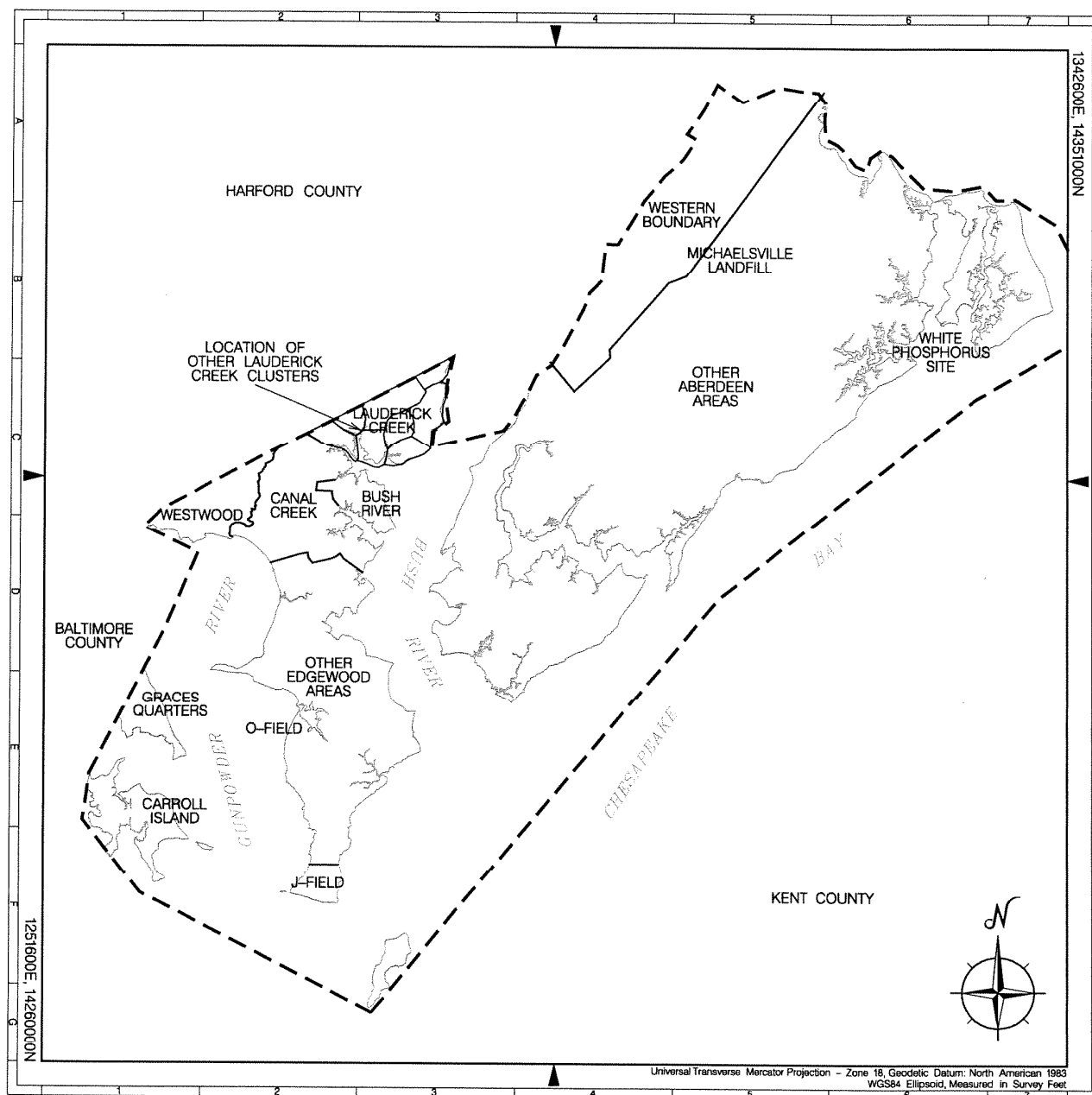
The Proposed Plan provides a summary of the remedial alternatives considered during the detailed analysis phase of the Feasibility Study (FS), identifies the preferred alternative, and explains the rationale behind the lead agency (the Army) recommending the preferred alternative. The Proposed Plan provides the public with pertinent information needed to participate with APG, EPA, and MDE in the selection of the most appropriate remedial alternative.

One of the four sites requiring further remedial response is the Cluster 9 Surficial Aquifer, which is contaminated with low concentrations of trichloroethylene and other constituents. The preferred remedy for the Cluster 9 Surficial Aquifer is land use controls (LUCs) to prohibit future unrestricted groundwater use. The other three sites requiring a remedial response are adjacent sites within Cluster 5, and which together are referred to as the Cluster 5 Concrete Slab Test Site (Figure 3). This Proposed Plan summarizes the remedial alternatives considered feasible by the Army and identifies the Army's preferred alternative for the Cluster 5 Concrete Slab Test Site.

The remedial alternatives evaluated by the Cluster 5 Feasibility Study are as follows: Alternative 1, No Action; Alternative 2, Remove Surface Waste and Construct Soil Cover; Alternative 3, Remove Waste and Control Sediment Runoff; Alternative 4, Land Use Controls. The preferred alternative is to Remove Waste and Control Sediment Runoff. Alternative 3 is protective of human health and the environment; provides short-term and long-

REMEDIAL RESPONSE PROCESS





LEGEND

Aberdeen Proving Ground — — Installation Boundary
Water — Study Area Boundary



6700 Alexander Bell Drive
Columbia, MD 21046

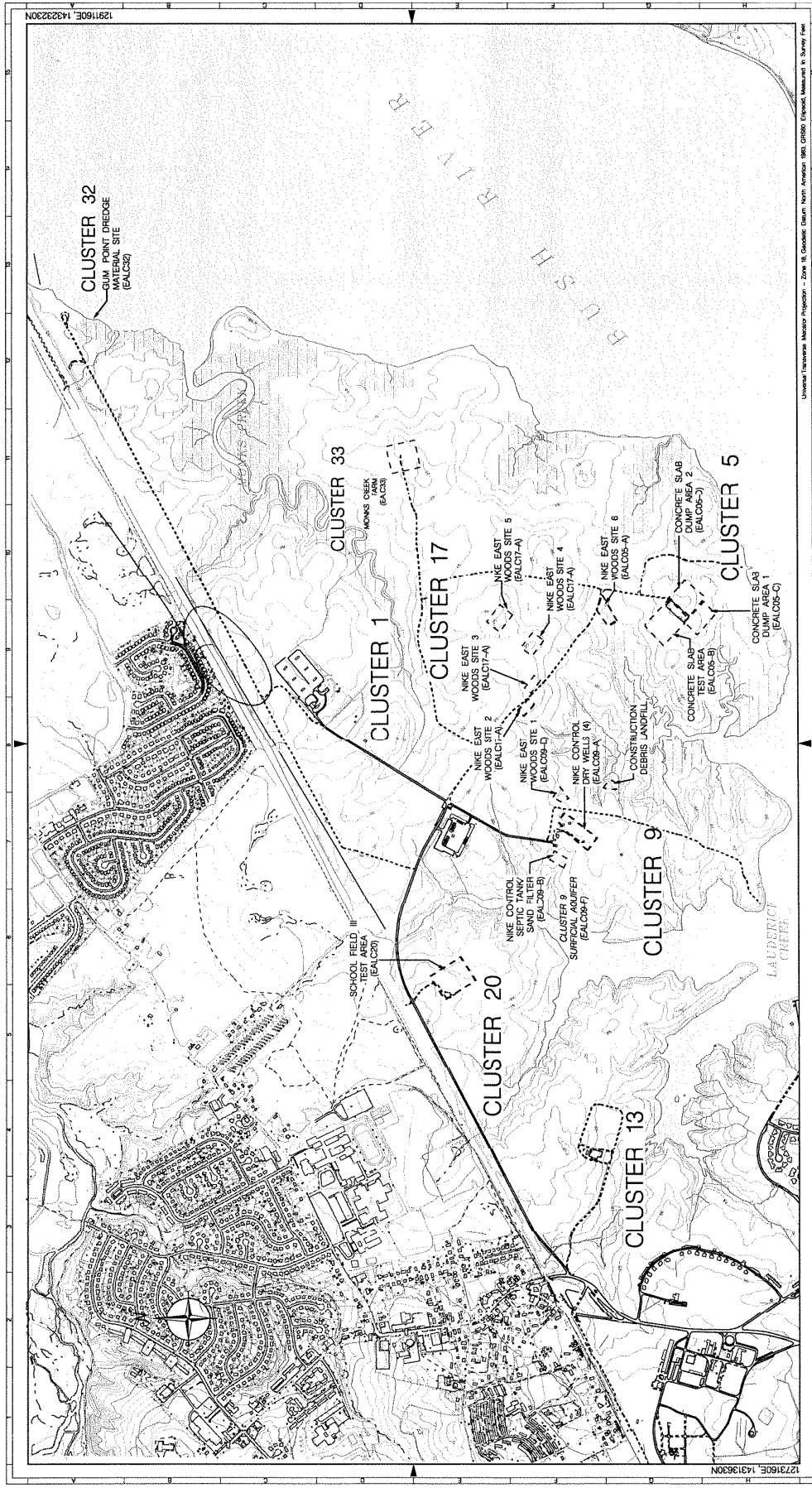
(800) 727-6677
www.genphysics.com

TITLE:

LOCATION OF OTHER LAUDERICK CREEK CLUSTERS

CARTOGRAPHER: B. JOYCE	APPROVED BY: M. BROOKS	DATE: 06-15-01	FIGURE: 1
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c:\Documents and Settings\BJoyce\Desktop\edgewood\apg_c5.dgn



LEGEND

- Structure
- Paved Road
- Unpaved Road
- Water
- Wetland
- Topography
- Railroad
- Tie line

OTHER LAUDERICK CREEK CLUSTERS DSERTS/INVESTIGATION SITES

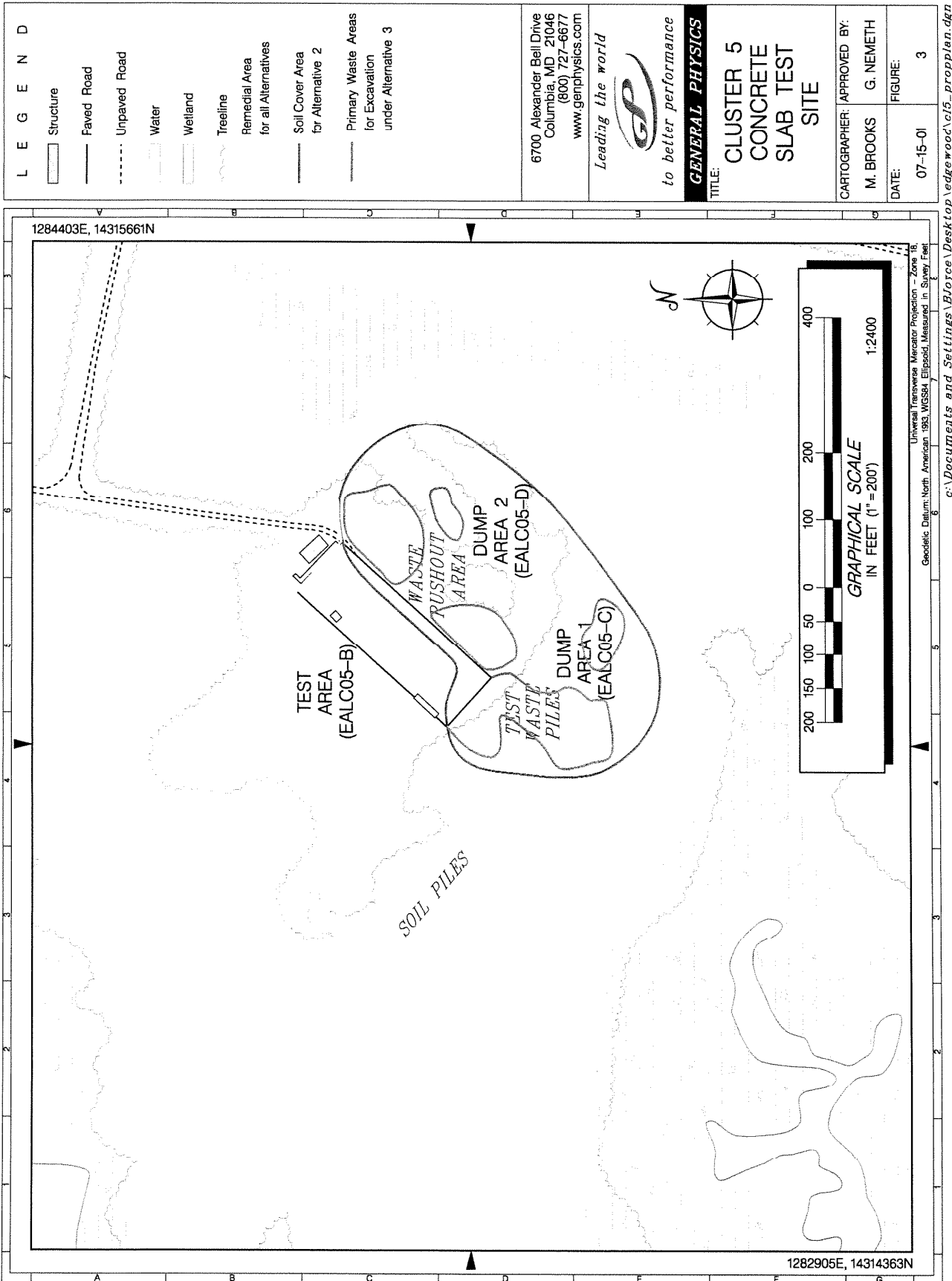
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1200 900 600 300 0 600 1200 2400

GRAPHICAL SCALE
IN FEET (1" = 1200')

APPROVED BY: G NEMETH
DATE: 07-15-01
FIGURE: 2

CARTOGRAPHER: M. BROOKS
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Columbia, MD 21046
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term effectiveness and permanence; partially reduces the toxicity, mobility, or volume of the constituents; and complies with all Applicable or Relevant and Appropriate Requirements (ARARs). The Army is the Lead Agency for this action. This document is issued by the Army (site owner) in concurrence with the EPA (the lead regulatory agency for site activities) and in consultation with the MDE (the support agency for the sites). Following public review and comment, the Army, EPA, and MDE – in consultation with the public – will select a remedy for the Other Lauderick Creek Clusters in a Record of Decision (ROD).

The Army issues this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act, commonly known as the “Superfund Program,” and the National Environmental Policy Act.

The Proposed Plan summarizes information that can be found in greater detail in the FS Report and other documents found in the Administrative Record. The public is encouraged to review these documents to gain a more comprehensive understanding of the site and the environmental activities conducted to date. Although the Proposed Plan highlights the FS Report, it is not a substitute for this document.

The administrative record, which contains the information used to select the response action, is available for public review at the following locations:

Harford County Library - Aberdeen Branch
21 Franklin Street
Aberdeen, MD 21001
(410) 273-5608

Harford County Library - Edgewood Branch
2205 Hanson Road
Edgewood, MD 21040
(410) 612-1600

Kent County - Washington College
Miller Library
Chestertown, MD 21620
(410) 778-2800

Based on the new information that may become available or on public comments, the Army and EPA – in consultation with MDE – may modify the preferred alternative outlined in this plan. Therefore, the public is encouraged to review and comment on all alternatives discussed herein.

A public comment period will extend from November 9 to December 24, 2001. This period will include a public availability session during which the Army, EPA, and MDE will present information on the sites and answer questions. The availability session is scheduled for November 15, 2001 at 6:30 p.m. at the Edgewood Senior Center, Edgewood, Maryland. The Cluster 5 Concrete Slab Test Site requires

DATES TO REMEMBER

Public Comment Period:

November 9 to December 24, 2001

The Army will accept written comments on the Proposed Plan during the public comment period.

Public Meeting:

November 15, 2001

The Army, EPA, and MDE will hold a public meeting to explain the Proposed Plan and to answer any questions. Oral and written comments will also be accepted at the meeting. The meeting is scheduled for November 15, 2001, at 6:30 p.m. at the Edgewood Senior Center in Edgewood, Maryland. An information / poster session at 6:30 p.m. will be followed by a presentation at 7:15 p.m.

remedial action because wastes associated with testing of incendiary munitions at the site were discarded and have released and continue to release contaminants, principally metals, to the soil. Contaminants have migrated by erosion and sediment transport to the nearby wetland area associated with Lauderick Creek. The baseline risk assessment (BRA) identified potential risks to ecological receptors, and wastes at the site are a potential threat to human health and safety.

SITE BACKGROUND

APG is a 72,500-acre Army installation located in southern Harford and Southeastern Baltimore County, Maryland on the western shore of the

Upper Chesapeake Bay. APG is divided into two noncontiguous areas referred to as the Aberdeen Area and the Edgewood Area.

The installation is bordered to the east and south by the Chesapeake Bay; to the west by Gunpowder State Park, the Crane Point Power Plant, and residential areas; and to the north by the towns of Edgewood, Joppa, Magnolia, and Aberdeen. The Bush River divides APG into the Edgewood Area to the west and the Aberdeen Area to the east.

Since 1917 the Edgewood Area has been a center for research, development, testing, and manufacture of military related chemicals and chemical agents. The Edgewood Area is listed on the National Priorities List (NPL). The NPL is the EPA's list of hazardous waste sites in the United States considered priorities for long-term remedial evaluation and response.

The Lauderick Creek Study Area (Figure 1) is in the Edgewood Area of APG and includes the entire area east of the Edgewood gate. The installation boundary is to the north, Lauderick Creek to the south and west, and Bush River is to the south and east. The Army has investigated numerous sites within the Lauderick Creek Study Area where hazardous substances could have been used or disposed of in the past.

In 1991, the Generic Work Plan for remedial investigation (RI) at the Edgewood Area of APG was published and divided the Lauderick Creek Study Area into:

- Cluster 1 Nike Missile Battery Launch Area
- Cluster 5 Concrete Slab Area,
- Cluster 9 Nike Missile Battery Control Area,
- Cluster 13 School Fields I and II Area
- Cluster 17 East Woods Disposal Areas
- Cluster 20 School Field III Area
- Cluster 32 Gum Point Dredge Spoils Area
- Cluster 33 Monks Creek Farm Site

Clusters 5, 9, 17, 20, 32 and 33 are included in the Other Lauderick Creek Clusters RI Report. Clusters 1 and 13 are addressed under separate RI reports.

The Lauderick Creek Study Area served as a training area for the Army Chemical School from 1920 until 1951. The Army designated portions

of the area as School Fields I through IX. Training activities in the School Fields included the firing of chemical ordnance such as grenades, Livens projectiles, Stokes mortar rounds, and 4.2-inch mortar rounds. Training also included identification of chemical agents and decontamination of personnel, vehicles, and related equipment; clothing impregnation and laundering; and handling and servicing of chemical warfare equipment, such as bulk storage containers. Training also included instruction, and possibly field practice, in the disposal of chemical agents, chemical ordnance, and chemical agent-contaminated material.

Other field operations involved the use of conventional materials, such as gasoline and diesel fuel for vehicles, and heating fuel. Small-scale disposal operations involving the burning of waste was also conducted at the site.

The Army constructed and first used the Cluster 5 Concrete Slab Test Site during World War II for the testing of incendiary munitions, and pyrotechnic and flamethrower projects. These testing activities continued through the 1950s and 1960s, and possibly into the early 1970s.

Materials used in incendiary munitions during the World War II period include black powder (i.e., potassium nitrate, charcoal, and sulfur), white phosphorus, flaked and grain aluminum metal, sulfur, castor oil, barium nitrate, and thermite (i.e., aluminum powder and ferric oxide). Other potential chemicals used include explosives and metals, such as chromium and lead. There is no additional information regarding other types of chemical materials used during the testing activities.

From World War II to the early 1970s, wastes, primarily expended test items, were disposed in the areas adjacent to the Test Slab. During the 1970s and early 1980s, the Army removed some munition items from the site during limited clean up activities.

The Generic Work Plan identified three potential source areas at the Cluster 5 Concrete Slab Test Site. These are the Concrete Slab Test Area, the Concrete Slab Dump Area 1 southwest of slab, and the Concrete Slab Dump Area 2 southeast of the slab (Figure 3). The Concrete Slab Test Site in this Proposed Plan

refers to and includes these three areas and the immediately surrounding vicinity, including the down slope runoff area between the waste and Lauderick Creek.

In 1998, field investigations to support the Other Lauderick Creek Clusters RI were completed. Activities included the installation of wells to monitor the groundwater, and the sampling of groundwater, surface water, sediment, and soil.

In 1994/1995, a removal action was conducted at the Concrete Slab Test Site and wastes not related to ordnance or explosives were removed from the site. Materials removed included eleven vehicle fuel tanks (commonly called saddle tanks) that had been located immediately northeast of the concrete slab and vertical wall. Also removed were a pile of empty drums and vehicle fuel tank remnants approximately 10 feet wide by 10 feet long by 4 feet high, that was located 300 feet northeast of the concrete slab.

The Other Lauderick Creek Clusters RI Report was published in 1999 containing the BRA. The BRA identified potential risks to ecological receptors, and wastes at the site are a potential threat to human health and safety. Based on this, an FS was recommended for the three adjacent areas that comprise the Concrete Slab Test Site. Additional data collection was performed during the FS to provide data necessary to evaluate remedial alternatives. The FS field activities were completed in January 1999, and the FS Report was published in April 2001.

SITE CHARACTERISTICS

The Lauderick Creek Study Area is located along the installation boundary in the extreme northeast portion of the Edgewood Area. It consists of a mixture of wetlands, upland forests, fields, and a few roads.

The Nike East Woods Sites 1 through 6 are located in the wooded area east of the former Nike Site, and are small areas of historical activity believed to be related to chemical warfare training. Nike East Woods Site 1 is a grass-covered area with areas of subsidence located just within the woods east of the Nike Control Area (Figure 3). Aerial photography from 1958 suggested that there could have been

disposal at the site. Site inspection revealed an empty 55-gallon drum and scattered scrap metal.

Nike East Woods Site 2 lies adjacent to the southwest side of the trail through the wooded area southeast of the Nike Barracks (Figure 3). Aerial photography from 1958 indicates activity involving the possible storage of 55-gallon drums. Site inspections during the RI did not find any evidence of drum storage or surface debris. The site is currently a small, grass-covered clearing within the wooded area.

Nike East Woods Site 3 is located approximately 200 feet southeast of Nike East Woods Site 2, on the northeast side of the trail (Figure 3). This site was also visible in 1958 aerial photography. Site inspection during the RI revealed intermittently placed piles of debris, mostly concrete, mixed with soil, in an area 200 feet in length alongside the trail.

Nike East Woods Site 4 is located approximately 500 feet east of Nike East Woods Site 3. Also visible in a 1958 aerial photograph, RI site inspections revealed a small pile of debris and soil.

Nike East Woods Site 5 lies northeast of Nike East Woods Sites 3 and 4, and consists of buried and exposed debris within a clearing in the woods.

Nike East Woods Site 6 is located southeast of Nike East Woods Sites 2, 3 and 4, and 800 feet north of the Concrete Slab Test Site (Figure 3). Visible in the 1958 aerial photograph as a ground scar area, the site contains construction debris.

The Construction Debris Disposal Area is a fill site located at the edge of the marsh southeast of the former Nike Missile Battery Control Area (Figure 3). The site was used for disposal during construction of the Nike Missile Battery in the 1950s.

The Gum Point Dredge Spoils Area is located in the most extreme northeast corner of the Lauderick Creek Study Area, adjacent to the Bush River and the installation northern boundary (Figure 3). The site is a small area

used for disposal of dredge spoil sometime during the 1960s or 1970s.

The Monks Creek Farm Site is located in the eastern portion of the Lauderick Creek Study Area, south of Monks Creek. The site is the location of a farmstead that existed prior to the land becoming government property. Review of aerial photography dating from 1936 to the post-World War II period shows the site to be partially cleared with ground scarring, indicating activity at the site. It is likely that the Army Chemical School used the farm site for training activities.

The School Field III Test Area is located in the northwest portion of the Other Lauderick Creek Clusters (Figure 3). The site was used by the Army Chemical School from the early 1920s until approximately 1950 for chemical warfare training. From that time until the late 1960s or early 1970s the site was used for testing of incendiary and flame devices and materials. Debris from testing was left in the field and several small dump sites.

The Nike Missile Battery Control Area was the location of radar used for target tracking and missile control. Small quantities of chlorinated solvents were used in the area for electronics maintenance. Waste management features at the site included four Nike Control Dry Wells, and the Nike Control Septic Tank and Sand Filter Bed (Figure 3). The shallow groundwater at the site, the Cluster 9 Surficial Aquifer, is contaminated with low concentrations of chlorinated solvents and nickel.

The Concrete Test Slab Site surrounds and includes a concrete pad approximately 300 by 100 feet with a vertical steel reinforced concrete wall across the northeastern end. Trees surrounding an area of disturbed soil and wastes southeast of the concrete pad appear to be secondary growth. The trees beyond the fringe area at the edge of the clearing appear to be older growth, indicating the tree line has encroached upon the site since it was active. Marshes of Lauderick Creek tributaries are located between 200 and 300 feet south and west of the site. Currently, the Maryland Army National Guard uses the site for training.

The Concrete Slab Test Site has been characterized by geophysical survey, X-ray fluorescence, test digs, and soil sampling and analysis during FS field activities. Site inspection and characterization indicates that waste from testing was disposed in several areas, both in piles and by pushing into topographic low areas adjacent to the slab.

Most of the waste disposal was in the "Waste Pushout Area", which extends approximately 250 feet southeastward from the slab. Remnants of an old fence are located just within the southeastern side of the Waste Pushout Area, and reconnaissance surveys of this area using magnetic equipment indicate wastes are primarily within the formerly fenced area.

Geophysical survey indicates that much of the test waste in the Waste Pushout Area is in two locations immediately adjacent to the southeast side of the slab at the southern and northern ends. A test dig in the southernmost of these two locations shows the waste to have been burned. Metallic anomalies are more dispersed within new growth trees and are infrequent within older growth trees extending toward the east. In addition, a raised area with a large intensity of metallic anomalies was observed near the center of the Waste Pushout Area. Test digs within the Waste Pushout Area found assorted metallic pieces, building debris, and a concrete dry well or cistern. Based on test digs and topographic observations of the area during field reconnaissance surveys, the waste is expected to be approximately two feet deep and no deeper than four feet.

A second area of disposal, referred to as the "Test Waste Pile Area", is located south of the concrete pad. It is comprised of two piles consisting primarily of discarded test and ordnance related wastes mixed with a small amount of soil, with scattered metallic wastes surrounding the piles. These wastes include spent incendiary and pyrotechnic munitions, munitions fragments, spent rocket motors, and similar items. The Test Waste Piles were possibly created after recovery of the materials from other areas within Cluster 5.

A third waste disposal area, the "Soil Pile Area" is a row of soil piles extending to the northwest from the Test Waste Pile Area. A magnetic

survey of the soil piles, conducted during the FS, shows they contain metallic items. Also, test digs within the piles found assorted metallic wastes and ordnance related scrap. These piles appear to have been created as a result of pushing soil and debris out from the work area northwest of the slab and from the slab itself.

SCOPE AND ROLE OF RESPONSE ACTION

The role of the response action at the Cluster 5 Concrete Slab Test Site is to protect human health and safety, to protect ecological receptors, and to prevent further migration of contaminants to the adjacent Lauderick Creek wetlands.

The sites located in the Cluster 1 Nike Battery Missile Site were addressed in a separate Record of Decision published in September 1996. Currently in Cluster 13, a Feasibility Study is being conducted to evaluate the remedial alternatives for the contaminated groundwater. A separate Proposed Plan and Record of Decision will address the Cluster 13 sites and groundwater.

IDENTIFICATION OF ENVIRONMENTAL CONTAMINATION AND SITE RISKS

Initial screening and records review identified sites to be included in the Other Lauderick Creek Clusters Remedial Investigation. These sites are listed below, together with their Site and Cluster identification numbers presented in the RI report, and their Defense Site Environmental Restoration Tracking System (DSERTS) numbers. The sites investigated in the Other Lauderick Creek Clusters RI are as follows (Figure 2):

"No Risk" Sites which require No Further Action

- Nike East Woods Site 6 (Cluster 5, EALC05-A)
- Nike Control Dry Wells (4) (Cluster 9, EALC09-A)
- Nike East Woods Site 1 (Cluster 9, EALC09-D)
- Construction Debris Disposal Area (Cluster 9, Unnumbered)
- Nike East Woods Site 2 (Cluster 17, EALC17-A)

- Nike East Woods Site 3 (Cluster 17, EALC17-A)
- Nike East Woods Site 4 (Cluster 17, EALC17-A)
- Nike East Woods Site 5 (Cluster 17, EALC17-A)
- Gum Point Dredge Material Site (Cluster 32, EALC32)
- Monks Creek Farm Site (Cluster 33, EALC33)

Removal Action Sites which require No Further Action

- Nike Control Septic Tank/Sand Filter (Cluster 9, EALC09-B)
- School Field III Test Area (Cluster 20, EALC20)

Sites Requiring Further Remedial Response Addressed under this Proposed Plan

- Concrete Slab Test Area (Cluster 5, EALC05-B)
- Concrete Slab Dump Area 1 (Cluster 5, EALC05-C)
- Concrete Slab Dump Area 2 (Cluster 5, EALC05-D)
- Cluster 9 Surficial Aquifer (Cluster 9, EALC09-F)

Of the 16 sites listed above, 12 do not require any further action since they do not pose any known threat to human health or to the environment. Removal actions were accomplished at three of these sites to remove waste material. Four sites remain which require further remedial actions. The removal actions and the four sites requiring further remedial actions are summarized below. All 16 sites within the Other Lauderick Creek Clusters are addressed by this Proposed Plan.

1. Removal Actions

Concurrent with RI activities, several removal actions were conducted involving the removal of surface debris, closure of septic systems, and removal of underground storage tanks. These actions mitigated environmental and health hazards presented by contaminated materials.

In 1994/1995, surface debris was removed at the Cluster 20 School Field III Test Area

(EALC20) to minimize any potential threat posed to human health or the environment. The site requires no further remedial action since the sites do not pose a threat to human health or the environment. As previously discussed, a removal action was also conducted at the Cluster 5 Concrete Slab Test Site and some wastes not related to ordnance or explosives were removed during the same timeframe.

A Removal Action was completed at the Nike Barracks Septic System (EANS01-H) located near building E6810. The discharge pipe and chlorination building were removed in December 1994. This site requires no further action because it does not pose a risk.

The Other Lauderick Creek RI report recommended the removal of the Nike Control Septic Tank/Sand Filter (EALC09-B) in Cluster 9 because the identified contaminants in the sludge within the tank could potentially be released to the environment. In September 2000, the septic tank and associated sand filter were removed and the site requires no further action.

In June of 1997, a 1,000-gallon petroleum UST located approximately 50 feet north of Building E6891 in Cluster 5 Blast Slab Area was removed. The UST did not have any perforations and no soil contamination was noted.

2. Sites Requiring Further Remedial Response

The Cluster 9 Surficial Aquifer (EALC09-F) contains the groundwater beneath the Cluster 9 (approximately 50 acres in size). Contaminants (specifically, trichloroethene, 1,1-dichloroethene, and nickel) were detected in the surficial aquifer at concentrations exceeding ARARs (i.e., maximum contaminant levels). A maximum contaminant level (MCL) is the maximum permissible level of a contaminant in water delivered to any public water system established pursuant to the Safe Drinking Water Act. The surficial aquifer is an EPA Class IIB aquifer to which maximum contaminant levels are applicable. The maximum detected concentrations of trichloroethylene and 1,1-dichloroethylene in groundwater were 60 ug/L and 11 ug/L, exceeding the MCLs of 5 ug/L and 7 ug/L, respectively, for these

compounds. Nickel was detected at concentrations of up to 213 ug/L, exceeding the MCL of 100 ug/L.

The excess lifetime cancer risk to future industrial workers from ingestion of groundwater at Cluster 9 was estimated to be 1×10^{-5} , which is within EPA's acceptable risk range. The non-cancer hazard indices associated with exposure to groundwater at the site were all less than 1. There are no known source areas that are currently releasing contaminants into the groundwater and contamination was not detected in the downgradient surface water. This indicates that the groundwater contamination is localized within Cluster 9 and not releasing into the surface water.

Therefore, it is recommended that a limited action be employed at this site. It is recommended that the remedial action consist of implementation of institutional controls to ensure the protection of future land users. Institutional controls would consist of groundwater use restrictions to be placed in the APG Master Plan. LUCs implemented will be presented in the ROD, and will be incorporated into a site-specific Land Use Controls Implementation Plan (LUCIP). The LUCIP will be appended to the APG base-wide Land Use Controls Assurance Plan (LUCAP) currently under development. The LUCAP/LUCIP will provide the means to evaluate the effectiveness of the groundwater institutional controls.

The other three sites requiring Remedial Action in the Lauderick Creek Study Area are the Cluster 5 Concrete Slab Test Area (EALC05-B), Concrete Slab Dump Area 1 (EALC05-C), and Concrete Slab Dump Area 2 (EALC05-D). The BRA indicated that wastes at the site are a potential threat to human health and safety, and there is a potential for adverse effects to ecological receptors from the wastes and contaminants at the site.

SUMMARY OF SITE RISKS

A BRA was conducted to assess the potential for adverse effects associated with exposure to contaminants in the absence of any institutional controls or remedial actions. This BRA evaluated risk at the Cluster 5 Concrete Slab Test Site and was included in the Other

Lauderick Creek RI Report. The BRA provides the basis for determining whether or not remedial action is necessary and the justification for performing remedial actions.

A conceptual site model was developed with sources, potential exposure pathways, and exposure media relevant to the Concrete Slab Test Site. The primary sources of contamination are waste from testing in piles and pushout areas adjacent to the test slab. The primary release mechanisms are corrosion releasing metals to soil, deposition of contaminants on the surface during waste disposal, and infiltration/percolation of the waste constituents in the pushout area to surface and subsurface soil.

Possible secondary release mechanisms for surface soil include fugitive dust generation, volatilization, biotic uptake, and leaching to groundwater. The RI determined that volatilization and leaching to groundwater are not of substantial concern because of the non-volatile and low mobility characteristics of the metals and pesticides that are constituents of concern. The exposure pathways include air, biota, groundwater, and direct contact with soil.

The BRA did not identify human health constituents of concern in sediment, soil, surface water or groundwater at Cluster 5. The excess lifetime cancer risk was less than 10^{-6} and the hazard indices were less than 1 for soil, sediment and surface water exposure pathways for both current and future receptors. For Cluster 5 groundwater, the hypothetical cancer risk to future workers from usage of groundwater was estimated to be 2×10^{-5} , with beryllium as the predominant constituent contributing to risk. Because the risk associated with exposure to groundwater is within the EPA acceptable risk range (10^{-6} to 10^{-4}), beryllium was not identified by the BRA as a final contaminant of concern requiring remediation.

The BRA identified constituents of potential concern in soil and sediment with potential for adverse impacts to ecological receptors. The concentrations of cadmium, silver and 4,4'-DDE in the sediment of Lauderick Creek immediately southwest of the Concrete Slab Test Site exceeded ecological screening values. Toxicity reference values for lead and zinc in soil were

also exceeded in certain samples. The metals in soil and sediment are related to military activities and wastes at Cluster 5.

Subsequent to the RI/BRA, a detailed site inspection, geophysical investigation, additional soil sampling, and test digs were conducted at the Concrete Slab Test Site. A magnetic survey was performed to identify specific areas where waste was disposed. Following the magnetic survey, an x-ray fluorescence survey was conducted to assess the surficial concentrations of 25 separate metals. Based on the results of the magnetic and x-ray fluorescence surveys, the locations of the supplemental soil sampling were selected. Fourteen test digs were conducted to assess wastes in mounds and subsurface waste in areas identified during the magnetic survey.

The wastes identified through site inspection and characterization (i.e., test digs) pose a threat to land users. Wastes are from testing of incendiary and pyrotechnic munitions, and explosive and pyrotechnic materials pose a threat to workers and military personnel at the site.

The soil sampling and analysis performed during the FS was within areas of waste disposal, and identified substantially higher concentrations of metals in soil than detected during the RI. The highest concentrations of lead (i.e., 2,480 mg/kg) and other metals is in soil directly associated with the piled and subsurface wastes. The continued corrosion of the metallic wastes in the future will result in increasing concentrations of metals in soil. Without remediation, the metals in soil at the Cluster 5 Concrete Slab Test Site pose an unacceptable risk to military/industrial land users. The metals in soil also pose a potential risk to terrestrial ecological receptors, and the potential for ecological impact is expected to increase in the future. It is expected that without remediation, additional migration of metals to Lauderick Creek will occur, increasing the potential for risk to aquatic and wetland receptors.

REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are goals developed for the protection of human health and the environment. RAOs based on

protection of human health, protection of ecological receptors and on contaminant migration were developed, as appropriate, for the Lauderick Creek Concrete Slab Test Site. The identified RAOs are:

- Protect military/industrial workers from hazards associated with waste at the Concrete Slab Test Site
- Control the migration of arsenic, barium, cadmium, copper, lead, mercury, nickel, silver, zinc, 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT from waste and soil in the Concrete Slab Test Site to the adjacent Lauderick Creek wetland area
- Protect ecological receptors in Lauderick Creek and the associated wetland adjacent to the Concrete Slab Test Site from risks associated with arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, silver, zinc, 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT
- Protect terrestrial ecological receptors from risks associated with barium, cadmium, chromium, copper, lead, silver, zinc, 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT

SUMMARY OF ALTERNATIVES

Remedial alternatives for the Cluster 5 Concrete Slab Test Site are presented below.

Alternative 1: No Action

Estimated Capital Cost: \$0

Estimated Five-Year Review Cost: \$15,000 once every 5 years

Estimated Total Present Worth Cost: \$52,000

Estimated Construction Timeframe: No construction

Estimated Time to Achieve RAOs: Will not achieve RAOs

The National Contingency Plan requires the consideration of the "No Action" alternative. Under the No Action alternative for the Concrete Slab Test Site, no remedial efforts would be made to control risks to human or ecological receptors; treat or remove wastes; or reduce the toxicity, mobility, or volume of contaminated media. Institutional controls would not be implemented, and actions (such as land use restrictions) would not continue.

Alternative 2: Remove Surface Waste and Construct Soil Cover

Estimated Capital Cost: \$1,123,000

Estimated Annual O & M Cost: \$10,800 annually plus \$25,000 once every 5 years

Estimated Total Present Worth Cost: \$1,417,000

Estimated Construction Timeframe: 6 months to construct after approval of remedial design and work plan

Estimated Time to Achieve RAOs: Circa 2003

Action under this alternative would consist of removing surface waste and constructing a soil cover over the area containing subsurface waste. The Concrete Slab Test Site encompasses an area of 8.2 acres southeast and southwest of the slab from which surface waste would be removed. The area of subsurface waste and contaminated soil over which the soil cover would be constructed is 3.5 acres (Figure 3). Monitoring of the Lauderick Creek wetland would be implemented to verify the remedy effectiveness.

Alternative 3: Remove Waste and Control Sediment Runoff

Estimated Capital Cost: \$1,475,000

Estimated Annual O & M Cost: \$7,800 annually plus \$25,000 once every 5 years

Estimated Total Present Worth Cost: \$1,712,000

Estimated Construction Timeframe: Eight months to construct after approval of remedial design and work plan

Estimated Time to Achieve RAOs: Circa 2003

Action under this Alternative would consist of removing surface and subsurface waste and controlling erosion and sediment runoff. Monitoring of the Lauderick Creek wetland would be implemented to verify the remedy effectiveness.

The initial action would be the removal of surface waste from scattered locations within the remedial area that is roughly nine acres in size. The "Test Waste Piles" and soil piles (i.e., "Soil Pile Area"), which contain waste, would then be remediated. Following the remediation of surface and piled wastes, the "Waste Pushout Area" will be excavated to remove waste. The

depth of waste in this area is expected to be less than two feet at most locations, but could be as much as four feet in small areas. All wastes will be classified and segregated for disposal. Waste disposal will be in accordance with Federal and State regulations for management of hazardous and non-hazardous solid waste.

Sampling and analysis has shown that the highest concentrations of lead and other metals are in soil that is directly associated with waste. Corrosion of the metallic waste and leaching has contaminated this soil that is mixed with the waste. When the wastes are removed from piles and excavated from the pushout area, the soil that is mixed with and immediately beneath the waste will also be removed/excavated and managed as a waste. The removal of waste and the soil that is directly associated with waste from the site will mitigate risk to industrial workers and military personnel, eliminate the potential for further migration of metals to Lauderick Creek, and substantially reduce the potential risk to terrestrial ecological receptors.

Special access controls or restrictions will not be necessary to protect industrial/military personnel after implementing this remedial action. Note that the Cluster 5 Concrete Slab Test Site is within a range area that contains unexploded ordnance, and that the existing safety procedures intended to protect workers and military personnel from ordnance hazards will continue to be implemented. Land use controls under this remedial alternative would prohibit future residential land usage.

Alternative 4: Land Use Controls and Monitoring

Estimated Capital Cost: \$195,000
Estimated Annual O & M Cost: \$54,000 annually plus \$15,000 once every 5 years
Estimated Total Present Worth Cost: \$1,319,000
Estimated Construction Timeframe: 6 months to implement after approval of work plan
Estimated Time to Achieve RAOs: Will not achieve RAOs and will not provide long-term effectiveness and permanence

This alternative would consist of LUCs to restrict access to, use of, and disturbance of the areas containing waste. Monitoring of sediment and soil would be accomplished to assess the impact

of corrosion and contaminant transport processes on the nature and extent of contamination, and subsequently on ecological receptors.

EVALUATION OF ALTERNATIVES

Nine criteria are used to evaluate the different remedial alternatives individually and against each other in order to select the remedy. The nine evaluation criteria are discussed below. The "Detailed Analysis of Alternatives" can be found in the Cluster 5 Concrete Slab Test Site FS Report.

1. Overall Protection of Human Health and the Environment

Both Alternative 2 and Alternative 3 would be protective of human health and the environment. Alternative 2 would achieve this protection with a soil cover and long-term LUCs to prevent exposure of human and ecological receptors. Alternative 3 would provide protection by removing waste material. Alternative 4 would protect human health through long-term LUCs, but would not ensure protection of ecological receptors.

Since Alternative 1 is not protective of human health or the environment, it is eliminated from consideration under the remaining eight criteria.

2. Compliance with ARARs

Alternatives 2 and 3 would meet respective ARARs. There are no chemical-specific ARARs for the contaminants of concern in soil or sediment. Alternatives 2 and 3 meet all location-specific and action-specific ARARs including requirements related to the protection of the wetlands and Maryland Critical Areas. It is possible that Alternative 4 would not meet location-specific ARARs.

3. Long-term Effectiveness and Permanence

Risk would be eliminated in source areas and controlled in the wetland by Alternatives 2 and 3. The waste removal alternative is a permanent solution with long-term effectiveness. The long-term effectiveness and the degree of permanence for the soil cover alternative are

dependent on the effectiveness of long-term maintenance and LUCs. The long-term effectiveness of Alternative 4 in protecting human health is dependent on LUCs. Alternative 4 offers no long-term effectiveness or permanence in protecting ecological receptors.

4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

Both the soil cover and waste removal alternatives (i.e., Alternatives 2 and 3) reduce mobility and prevent future transport of contaminants to Lauderick Creek. Neither of the alternatives achieves this mobility reduction through treatment. The LUC and monitoring alternative (i.e., Alternative 4) does not reduce toxicity or volume of contaminants through treatment, and does not control the migration of contaminants to Lauderick Creek.

5. Short-term Effectiveness

Implementation of Alternatives 2 and 3 (soil cover and waste removal) would require proper engineering controls and health/safety procedures to protect remedial workers, the community, and the environment. Both alternatives would achieve remedial action objectives within one year of the start of construction. Alternative 4 would provide for protection of human health within one year of

the start of construction, but would never be effective in ensuring that further migration of metals to Lauderick Creek is prevented and that ecological receptors are protected.

6. Implementability

All alternatives would be relatively easy to implement. The area would be available for training use by the National Guard after Alternative 3 remediation is completed. Under Alternatives 2 and 4, the long-term LUCs would prohibit and prevent future use of the site for training or other military/industrial activity.

7. Cost

Alternatives 2 and 3 are considered relatively equal when considering cost as an evaluation criterion. The estimated cost for Alternative 3 is slightly higher than that for Alternative 2. However, uncertainty in factors influencing cost are likely to increase Alternative 2 costs and decrease Alternative 3 costs, and could make the Alternative 3 (waste removal) less costly.

Alternative 4, Land Use Controls and Long-Term Monitoring, is the least attractive alternative when considering cost. Because there would be no control of wastes or contaminant migration under Alternative 4, the level of effort and cost of monitoring would be higher for this alternative than for Alternatives 2 or 3, making the 30-year

	Alternative 1 No Action	Alternative 2 Soil Cover	Alternative 3 Waste Removal	Alternative 4 Land Use Controls
Protection of Human Health and the Environment	○	●	●	●
Compliance with ARARs	●	●	●	●
Long-Term Effectiveness and Permanence	○	●	●	○
Reduction of Toxicity, Mobility or Volume Through Treatment	○	●	●	○
Short-Term Effectiveness	○	●	●	●
Implementability	●	●	●	●
Cost	●	●	●	○
● Fully meets criterion ● Partially meets criterion ○ Does not meet criterion				

cost relatively high, with no associated benefit to human health or the environment.

8. State/Support Agency Acceptance

It is anticipated that MDE would concur with the selection of either Alternative 2 or 3 for the Cluster 5 Concrete Slab Test Site.

9. Community Acceptance

Community acceptance of the alternatives will be evaluated after the public comment period ends and will be described in the Record of Decision.

PREFERRED ALTERNATIVE

The Preferred Alternative for the Cluster 5 Concrete Slab Test Site is Alternative 3 (Remove Waste and Control Sediment Runoff). Both the soil cover (Alternative 2) and waste removal (Alternative 3) alternatives meet the RAOs and either fully or partially meet all evaluation criteria. The waste removal alternative may have a higher cost than the soil cover alternative. However, the waste removal alternative offers a more permanent solution.

COMMUNITY PARTICIPATION

The Army, EPA, and MDE are soliciting input from the community on each of the proposed alternatives for the Other Lauderick Creek Clusters. The comment period extends from November 9, 2001 through December 24, 2001 (45 days). This period includes an availability session at which the Army, EPA, and MDE will present the Proposed Plan and accept both oral and written comments.

APG invites the public to attend a meeting at which representatives from APG, EPA, and MDE will be available to discuss the Proposed Plan in further detail and answer any questions.

*November 15, 2001
6:30 p.m. information/poster session
7:15 p.m. presentation
Edgewood Senior Center, Edgewood, MD*

Comments and responses will be summarized in the Record of Decision, which is the document that presents the selected remedy. To send

written comments or obtain further information, contact any of the following representatives:

Mr. Kenneth Stachiw, Program Manager
Directorate of Safety, Health, and
Environment
ATTN: AMSSB-GSH-ER
5179 Hoadley Road
Aberdeen Proving Ground, MD 21010
(410) 436-3320

Mr. Steve Hirsh
U.S. Environmental Protection Agency
Region III
1650 Arch Street (3HS50)
Philadelphia, PA 19107
(215) 556-3352

Mr. John Fairbank
Maryland Department of the Environment
Waste Management Division
2500 Broening Highway
Baltimore, MD 21224
(410) 631-3496

Written comments must be postmarked no later than the last day of the public comment period, which is December 24, 2001.

EXPLANATION OF EVALUATION CRITERIA

I. THRESHOLD CRITERIA

- **Overall Protection of Human Health and the Environment** refers to whether a remedy provides adequate protection against harmful effects. It calls for consideration of how human health or environmental risks are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.
- **Compliance with applicable or relevant and appropriate requirements** (ARARs) addresses whether a remedy meets all the applicable or relevant and appropriate requirements of other federal and state environmental statutes.

II. PRIMARY BALANCING CRITERIA

- **Long-term effectiveness and permanence** refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment after cleanup goals have been met.
- **Reduction of toxicity, mobility, or volume** through treatment refers to the effectiveness of the treatment technologies in reducing the toxicity, mobility, or volume of contaminants.
- **Short-term effectiveness** refers to the speed with which the remedy achieves protection and to the remedy's potential during construction and implementation to have adverse effects on human health and the environment.
- **Implementability** refers to the technical and administrative feasibility of a remedy, including the availability of required materials and services.
- **Cost** includes capital expenditures and operation and maintenance costs.

III. MODIFYING CRITERIA

- **State acceptance** indicates whether the state concurs with, opposes, or has no comment on the preferred alternative based on its review of the RI/FS report and Proposed Plan.
- **Community acceptance** is documented in the Record of Decision following a review of public comments on the Proposed Plan.

ACRONYMS AND ABBREVIATIONS

APG	Aberdeen Proving Ground
ARAR	Applicable or Relevant and Appropriate Requirement
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COMAR	Code of Maryland Annotated Regulations
DSERTS	Defense Site Environmental Restoration Tracking System
EPA	U.S. Environmental Protection Agency
FS	Feasibility Study
LUCAP	Land Use Control Assurance Plan
LUCIP	Land Use Control Implementation Plan
LUC	Land Use Control
MCL	Maximum Contaminant Level
MDE	Maryland Department of the Environment
O&M	Operation and maintenance
RAO	Remedial Action Objective
RI	Remedial Investigation
ROD	Record of Decision
UST	Underground Storage Tank

GLOSSARY OF TERMS

Administrative Record – This is a collection of documents that contain information and reports generated during the site investigation and remediation. It is available for public review.

Applicable or Relevant and Appropriate Requirements (ARARs) – These criteria are set forth by federal and states statutes and regulations and must be considered in the evaluation of remedial alternatives.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) – A federal law, which was passed in 1980 and is commonly referred to as the “Superfund Law”. It provides for the liability, compensation, cleanup, and emergency response in connection with the cleanup of inactive hazardous waste disposal sites that endanger public health or the environment.

Feasibility Study (FS) – This provides a detailed analysis of remedial alternatives for a site. This analysis supports risk management decisions to select the most appropriate remedy.

Maximum Contaminant Level (MCL) – The maximum permissible level of a contaminant in water delivered to any user of a public water system established pursuant to the Safe Drinking Water Act.

National Contingency Plan (NCP) – Officially the National Oil and Hazardous Substances Pollution Contingency Plan, the federal regulation that guides determination of the sites to be corrected under both the Superfund program and the program to prevent or control spills into surface waters or elsewhere.

National Environmental Policy Act (NEPA) – An act, enacted on January 1, 1970, stating that any federal branch or agency proposing a project that might have a significant effect on the environment must provide a detailed statement of the potential concerns.

National Priorities List (NPL) – The list, developed by EPA, identifies the uncontrolled hazardous substance release sites in the United States that are considered priorities for long-term remedial evaluation and response.

Record of Decision (ROD) – Signed by the Army and EPA, it provides the clean up action selected for a site, the basis for selecting that remedy, public comments on alternative remedies, responses to comments, and the cost of the remedy.

Remedial Investigation (RI) – The purpose of the Remedial Investigation is to characterize possible contamination and to identify sites that may require remedial action.

Superfund Amendments and Reauthorization Act (SARA) – This act amended CERCLA in 1986.